CLAIMS

What is claimed is:

1   1.   A method of designing a set of wavelet basis, the method comprising:

2   constructing a neural network of arbitrary complexity using a discrete and finite

3   Radon transform;

4   designing an input wavelet to fit a particular problem;

5   feeding an input wavelet prototype designed to fit a particular problem through the

6   neural network and its backpropagation to produce an output; and

7   modifying an input function of the neural network using the output.

1   2.   The method of claim 1 wherein constructing the neural network comprises

2   backprojecting the Radon transform to a point; and

3   subtracting a global average function of the point.

1   3.   The method of claim 2 wherein the global average function is dependent on the

2   transform geometry and may be varied by varying the interconnect structure of the neural

3   network.

1   4.   The method of claim 1 wherein the transform is dual to the network.

1   5.   The method of claim 4 wherein the transform is weighted to a desired template

2   function.

1   6.   The method of claim 1 wherein modifying the input function comprises subtracting

2   a difference between the input and the output from the input wavelet prototype and

3   moving the input function in the opposite direction from the difference so that the

4   difference converges to zero.

80398.P325   -31-

1   7.   The method of claim 1 wherein a central equation for the Radon transform is

2   selected from the group consisting of a Gindikin equation or a Bolker equation.

1   8.   The method of claim 1 wherein the wavelet bases are used to compress data

2   selected from the group consisting of images, multidimensional data, or spatiotemporal

3   data.

1   9.   The method of claim 5 wherein the template function is a sphere.

1   10.   A system for designing a set of wavelet basis, the system comprising:

2   means for constructing a neural network of arbitrary complexity using a discrete

3   and finite Radon transform;

4   means for designing an input wavelet to fit a particular problem;

5   means for feeding an input wavelet prototype designed to fit a particular problem

6   though the neural network and its backpropagation to produce an output; and

7   means for modifying an input function of the neural net using the output.

1   11.   A computer readable medium comprising instructions, which when executed on a

2   processor, perform a method of designing a set of wavelet basis, the method comprising:

3   constructing a neural network of arbitrary complexity using a discrete and finite

4   Radon transform;

5   designing an input wavelet to fit a particular problem

6   feeding an input wavelet prototype designed to fit a particular problem through the

7   neural network and its backpropagation to produce an output; and

8   modifying an input function of the neural net using the output.

1   12.   An apparatus for designing a set of wavelet basis, the apparatus comprising:

2   a neural network constructor that uses a discrete and finite Radon transform to

3   construct a neural network of arbitrary complexity;

4   a designing module to design an input wavelet to fit a particular problem, the

5   designing module coupled to the neural network constructor;

6   a feeder to feed an input wavelet prototype designed to fit a particular problem

7   through the neural network and its backpropagation to produce an output, the feeder

8   coupled to the designing module; and

9   a modifier module to modify an input function of the neural net using the output,

10   the modifier module coupled to the feeder.

1   13.   The apparatus of claim 12 wherein the neural net constructor is configured to

2   backproject the Radon transform to a point and to subtract a global average function of the

3   point.

1   14.   The apparatus of claim 13 wherein the global average function is dependent on the

2   transform geometry and may be varied by varying the interconnect structure of the neural

3   network.

1   15.   The apparatus of claim 12 wherein the transform is dual to the network.

1   16.   The apparatus of claim 15 wherein the transform is weighted to a desired template

2   function.

1   17.   The apparatus of claim 12 wherein the modifier module is configured to subtract

2   the difference between the input and the output from the input wavelet prototype and

3   move the input function in the opposite direction from the difference such that the

4   difference converges to zero.

1   18.   The apparatus of claim 12 wherein a central equation for the Radon transform is

2   selected from the group consisting of a Gindikin equation or a Bolker equation.

1   19.   The apparatus of claim 12 wherein the wavelet bases are used to compress data

2   selected from the group consisting of images, multidimensional data, or spatiotemporal

3   data.

1   20.   The apparatus of claim 16 wherein the template function is a sphere.